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## STUDIES IN THE GENUS BIDENS. III

CONTRIBUTIONS FROM THE HULL BOTANICAL LABORATORY 216

E. ARL E. SHERFF

(WITH PLATE XXXI)

**Bidens attenuata**, sp. nov.—Herba (annua?), +4 dm. alta; caule et ramis hispido-tomentosis, subtenuibus, subperspicue striatis, teretis (nisi caule infra angulato). Folia opposita (aut superiora alternata), petiolata, petiolo adjecto 1.5–6 cm. longa, bi- aut tri- (aut etiam quadri-) pinnata, subsparsum adpresso-hispida, hispidociliata; ultimis lobulis integris, linearibus, indurato-apiculatis, saepe convolutis, 0.3–0.7 mm. latis. Petioli 3–11 mm. longi, hispidi, ad basim connati. Capitula terminalia, ligulata, longe et tenuiter pedunculata, pedunculis 5–15 cm. longis. Involucrum basi hispidum; squamis duplici serie dispositis; exterioribus (circ. 6) linearibus, glabratiss aut sparsim hispidis, 3–4 mm. longis; interioribus dimidio longioribus, dense hispidis, margine diaphanis. Ligulae flavae, striatae, elliptico-ovatae, ad apicem subdentatae aut integrae, 1.8–2 cm. longa. Paleae lineares, margine diaphanis. Achaenia (submatura) linearia, glabra, costata, biaristata aristis retrorsum hamosis (3–6 glochidiis), 5 mm. longa.

*Ghiesbrecht*, Chiapas, Mexico (type in Herb. Gray).

ASA GRAY had labeled this plant in the herbarium "*B. ferulaefolia* var.," but the true *Bidens ferulaefolia* DC. (*Coreopsis ferulaefolia* Jacq., Hort. Schoenb. 3:65. pl. 375. 1798) is a very different plant.

**Bidens Andrei**, sp. nov.—Herba (ad basim suffrutescens?), 1–2 m. alta, glabrata, caule tetragono et striato; ramis tetragonis, striatis, (superioribus) irregulariter arcuatis et in nonnullos ramulos (aut pedunculos) divisus. Folia opposita, petiolata, petiolo adjecto 2.5–7 cm. longa, bi- aut tri- (aut quadri-) pinnata, supra minute et non dense adpresso-hispida; ultimis segmentis linearibus, integris aut lobulatis, indurato-apiculatis. Petioli 0.3–2 cm. longi, basi connati. Capitula multa, tenuiter pedunculata, pedunculis 4–12 cm. longis, 0.4 cm. (ad anthesin) –1 cm. (in fructu)

alta, ligulata. Involucrum basi plus minusve hispidum; squamis duplici serie dispositis et demum reflexis; exterioribus (circ. 6) linearibus, apiculatis, subsparsum pubescentibus, 1-2 mm. longis; interioribus lanceolatis, membranaceis, 2-3 mm. longis, margine diaphanis. Ligulae (6 aut pauciores) lanceolatae, 4-5 striatae, apice integrae, 3-4 mm. longae, in sicco specimine subalbae. Paleae lineares, margine diaphanae. Achaenia attenuato-linearia, supra sparsim hispida, biaristata aristis glabris aut retrorsum 1-3-hamosis, (interiora) demum 0.8-1 cm. longa.

*Ed. Andre* 2878, at altitude of 1250 m., Rio Juanambu, United States of Colombia, April 28, 1876 (type in Herb. Gray).

The 20-30 areolae on the old disks become prominent as the involucre reflex. There are 37 heads on the type specimen. The plant appears to be entirely herbaceous, but the label says "suffrutesc.," hence the lower part of the plant (not present on the sheet) may have been woody and perennial.

***Bidens mirabilis***, sp. nov.<sup>1</sup>—Herba volubilis glabra, caule subtereto, striato. Folia caulis petiolo adjecto 8-10 cm. longa, pinnata, foliolis irregulariter 3- vel 5-partitis, segmentis (ad marginem sparsim hispidis) ovatis et integris aut ad apicem 1-5 dentatis, petiolis 3-3.5 cm. longis; folia ramulorum parva, integra aut ternata. Capitula (floribus flavescentibus e Sprucei inscriptione) multa, parva, dense paniculata, discoidea, 3-5 mm. lata, 4-5 mm. alta. Involucrum glabratum, squamis duplici serie dispositis; exterioribus lineare-lanceolatis, laciniato-ciliatis, 1.5-2.5 mm. longis. Paleae lineares, 4-5 mm. longae, marginibus diaphanis. Stilorum rami breves, crassi, plus minusve obtusi. Achaenia late cuneato-lanceolata, plana, margine lobulata, lobulis coronatis 1-4 longis pilis; constricta ad apicem cervicis crassa, 8-10-aristata aristis inaequalibus et retrorsum hamosis.

*Spruce* 6273, Huambalpa, Andes Mountains, Peru ("Andes Quitenses, loco Huambalo"), November 1857 (type in Herb. Kew). Plate XXXI.

This is a very strange species and one that might be taken by some to represent a new genus; indeed, I know of no other species of *Bidens* combining

<sup>1</sup> Dr. J. M. GREENMAN (now of the Missouri Botanical Garden), to whom I shall express more extended thanks later for having inspired my research upon the genus *Bidens* and directed it during its early stages, and Dr. B. L. ROBINSON (of Gray Herbarium) have very kindly assisted me with certain library and herbarium data for this species.

more diverse characters. The twining habit is to be met with in *B. rubifolia* and its allies; the large number of achene awns (very rarely so numerous in *Bidens*) suggests a certain African species of *Bidens*, to be treated later; the shape of the achenes is rather that of *B. tripartita* and its allies; but the thick, necklike constriction at the apex of the achenes and below the awns is so pronounced as to suggest a slight affiliation with *Heterospermum*,<sup>2</sup> in which genus the outer, *winged* achenes are frequently so constricted.

*BIDENS PILOSA* L. Sp. Plant. 832. 1753.—*Bidens hispida* H.B.K. Nov. Gen. 4: 237. 1820; *Bidens andicola* H.B.K. var. *B.* Wedd. Chlor. And. 1: 70. 1855.

For many years, *Bidens hispida* H.B.K. appears to have remained a comparatively unknown form to botanists dealing with South American plants. WEDDELL'S treatment of it is short and arbitrary. No reasons are given by him for its reduction to *Bidens andicola* H.B.K.

The original type plant of *Bidens hispida*, as also that of *Bidens andicola*, remains in good preservation today (in Mus. Hist. Nat. Paris). In a very general way the two plants, both of them hispid, show a resemblance; but *Bidens hispida* is seen, on closer inspection, to have small heads and these, moreover, are discoid. Also, the lower part of the plant displays a wholly different foliage aspect from that found in more recent specimens of the yellow-rayed *B. andicola* (the lower part of the type for the latter species is lacking). The plant is seen to be merely a very hispid form of *B. pilosa* L. It is matched more or less exactly by many specimens in herbaria, particularly by some from Venezuela, Colombia, and Peru (for example, Mr. and Mrs. J. N. Rose 18740, Santa Clara, Peru, July 18, 1914, in U.S. Nat. Herb.).

*BIDENS ANTHRISCODES* DC. Prodr. 5: 600. 1836.

DECANDOLLE'S description of this species, based upon *Berlandier* 1010 and 1152, is much too narrow not to mislead. Excellent specimens of *Berlandier* 1010 are in London (in Herb. Brit. Mus.),

<sup>2</sup> A genus very closely connected with *Bidens* through *Heterospermum Xanti* Gray, the type of which (in Herb. Gray) is matched by that of *Bidens Xantiana* Rose (in U.S. Nat. Herb.); a species best retained in *Heterospermum*, a view in accord with the treatment by BRANDEGEE (Zoe 1: 309. 1890), who, moreover, has since *positively* corroborated (in litt. 1913) my equation of *Bidens Xantiana* Rose with *Heterospermum Xanti* Gray.

and these have some achenes 21 mm. long. *Berlandier* 1010 and 1152 both occur in Paris (in Herb. Mus. Hist. Nat. Paris and in Herb. E. Drake). These surpass the London specimens in that they show some of the heads to be radiate in anthesis (cf. DC. *l.c.*, "cephalis discoideis"). The flowering heads are small, about 9 mm. high and 4-5 mm. wide, or, including the rays, 1 cm. wide. The rays are small, strongly and definitely dark-roseate, about 5 mm. long (including the tube at base), broadly ovate-elliptic, somewhat 3-toothed at apex. The 8 outer bracts average about three-fifths of the length of the inner ones and tend to be indurate-tipped.

BIDENS NODIFLORA L. Sp. Plant. 832. 1753.—*Bidens nodiflora*, *brunellae folio* Dillen. Elth. 52. *pl.* 44. *fig.* 52. 1732: non *Bidens nodiflora*, *folio tetrahit*, *ibid.* 53. *pl.* 45. *fig.* 53.

A good specimen preserved in the Linnaean Herbarium matches the first figure of DILLENIUS very closely and is a true *Bidens*. Recently, DRUCE (The Dillen. Herb. 161. 1907) has cited this figure erroneously, as representing, along with *pl.* 45. *fig.* 53 (Dillen. *l.c.*), *Synedrella nodiflora* (L.) Gaertn., a species treated by LINNAEUS (Amoen. Acad. 4:290. 1759) as *Verbesina nodiflora*, and which is not at all a *Bidens*. DRUCE, as is indicated by his use of an asterisk, had not seen a Dillenian specimen matching *pl.* 44. *fig.* 52, but he referred to the *Index Kewensis* as his authority. However, an examination of that work (Ind. Kew. 1:301 and 2:1025. 1895), with proper regard for the kinds of type there employed, shows that *Bidens nodiflora* and *Synedrella nodiflora* are retained as distinct species and are not equated.

BIDENS FRONDOSA L. Sp. Plant. 832. 1753.—*Bidens melanocarpa* Wieg. Bull. Torr. Bot. Club 26:405. 1899.

GREENE (Pittonia 4:246. 1901) has given a good survey of pre-Linnaean authors and their treatment of the plant finally named *Bidens frondosa* by LINNAEUS. As additional evidence of the accuracy of GREENE'S conclusions regarding the characters of true *B. frondosa* L., there are the three specimens of LINNAEUS (two in Herb. Linn. and one in Herb. Hort. Cliff. at Herb. Brit. Mus.) and one of VAILLANT (in Herb. Mus. Hist. Nat. Paris). The first one of these has a flowering head with 9 or 10 elongate, foliose, exterior

involucral bracts (cf. Linn. *l.c.*, "calycibus frondosis") and "*HU* 4, *frondosa*" is written on the sheet.<sup>3</sup> Pinned with this sheet is a second sheet having a plant without label, but which is coarser and has about 14 exterior involucral bracts on the largest head. The third specimen is among the *Hortus Cliffortianus* specimens and matches the first specimen, even to having the same elongate foliose type of exterior bracts. LINNAEUS clearly had the first or the third specimen, and probably both, in mind when he drew up his description of *B. frondosa* for the *Species Plantarum*. The second specimen is probably *B. vulgata* Greene, but it is not labeled, and has no historical significance. The fourth specimen is the one formerly in VAILLANT's private herbarium. This last matches the two labeled Linnaean specimens perfectly. Bearing, as it does, in VAILLANT's own handwriting, the early names<sup>4</sup> afterward cited by LINNAEUS as synonyms for *B. frondosa*, it shows that VAILLANT, himself a student of the genus *Bidens*, likewise understood this species to be the smaller headed, fewer bracted, less robust form (and not the *B. vulgata* of GREENE).

*BIDENS CHINENSIS* Willd. Sp. Plant. 3:1719. 1800.—*Bidens pilosa* L. var. *B* Murray, Syst. Veg. ed. 13. 610. 1774; *Agrimonia molucca*, Rumph. amb. 6:38. pl. 15. fig. 2. 1750; *Chrysanthemum chinense*, etc., Plukenet, Phytograph. pl. 22. fig. 4. 1691; *idem* Almag. Bot. 100 (excl. syn.). 1696; *Bidens cicutaeifolia* Tausch, Flora 19:395. 1836.

Recently, O. E. SCHULZ (Engl. Bot. Jahrb. 50: Suppl. 176. 1914) has presented a good historical summary of this species with a comprehensive mass of synonymy. He shows clearly that the name *chinensis* harmonizes in its application with the *chinense* of PLUKENET given over a century before. Evidently, however, he was unaware that the plate of PLUKENET's *Phytographia* (*loc. cit.*) was the identical plate cited in 1836 by TAUSCH (*Flora, loc. cit.*) as the basis for *Bidens cicutaeifolia*; and that thus one of TAUSCH's

<sup>3</sup> Dr. B. DAYDON JACKSON, of the Linnaean Herbarium, assures me that "HU" was used by LINNAEUS to indicate that the plant was raised "*in Horto Upsalensi*."

<sup>4</sup> I am indebted to Professor P. DANGUY (of the Herb. Mus. Hist. Nat. Paris) for comparisons made with VAILLANT's known writing to verify the authenticity of these names. An extra label on the sheet "*Bidens frondosa* L." was written, according to Professor DANGUY, by LAMARCK.

ill-advised names, so long apparently enigmatic to botanists, is clearly reducible to synonymy.

*BIDENS HUMILIS* H.B.K. Nov. Gen. 4:234. 1820.—*Bidens decomposita hirsutior* C. B. Clarke, Compos. Ind. 141. 1876.

Clarke described his variety *hirsutior* from a single specimen collected by himself at an altitude of over 2200 m. in the Nilgiri Mountains of India. Later, he informed J. D. HOOKER (cf. Fl. Brit. Ind. 3:310. 1881) that he supposed it to be some cultivated plant. HOOKER admits having seen no specimen of it, but it happens that CLARKE's own original specimen ("11207 . . . . 23 March 1870 . . . . coll. C. B. Clarke . . . .") was sent to Kew Herbarium in 1877 and is still there in good condition. The plant is very different from *Bidens decomposita* Wall., but differs from certain South American specimens of the highly variable *B. humilis* H.B.K. only in being rather villous. Yet in the same region Dr. WATT collected material (*Watt* 2160, Metapollium, Nilgiri Hills, Southern India, up to nearly 1000 m., June 1876, in Herb. Kew) that agrees with CLARKE's specimen except that it is minutely pubescent as to leaves and glabrous as to stems. And, most fortunately, still two more specimens from this region occur (*Dr. Thomson*, Eclipse Exped., Nilgiris, December 1871, determined on sheet as "*Bidens humilis* H.B.K.," in Herb. Kew; and *R. H. Beddome* 4511, "introd.? a common weed," Nilgiris, in Herb. Brit. Mus.), both glabrous and indistinguishable from *B. humilis*. A study of these several specimens, all collected in the same region at about the same time, and by two of the collectors suspected of being introduced, shows beyond doubt that they were merely forms of *B. humilis* H.B.K. brought, perhaps in ballast, from South America to the southwest shores of British India.<sup>5</sup>

*BIDENS CRITHMIFOLIA* H.B.K. Nov. Gen. 4:234. 1820.—*Bidens delphinifolia* H.B.K. *loc. cit.*

The two type specimens from which KUNTH described *B. crithmifolia* and *B. delphinifolia* are still extant in good condition (in Herb. Mus. Hist. Nat. Paris). They differ only in the slightly diverse

<sup>5</sup> Since the above was written, I have had access to the very recent work of FYSON (Fl. Nilgiri and Pulney Hill-tops above 6500 feet 1:237. 1915). It is most interesting to find that FYSON, though omitting historical details, lists *B. humilis* from South America as an introduction into the Nilgiri Hill region, thus adding unique corroboration to my own conclusions presented above.

foliage. The immature type of *B. crithmifolia* is matched exactly by *J. Triana* 1374 (*ibid.*), a specimen from Bogota, Colombia, which is superior in showing not only flowering heads but also numerous achenes. These achenes are mainly 2-aristate, but some are 3-aristate and so agree perfectly with achenes of *B. delphinifolia*.<sup>6</sup> Fortunately, I have found another specimen by *Triana* of the same number in the British Museum, and this shows the slightly different foliage of *B. delphinifolia*, thus removing all doubt as to the identity of *B. delphinifolia* with *B. crithmifolia*.

This species is exceedingly variable in foliage. *Triana* 1375 (in Herb. Brit. Mus.) shows one plant with leaves tripartite, the leaflets being incisely dentate, and another plant with simple, ovate-lanceolate leaves. In fact, the sheet of *Triana* 1374 in Paris bears another specimen (beside that cited above) which has similarly simple, ovate-lanceolate leaves, showing that in the field *Triana* considered the simple leaves and the finely divided leaves as belonging to the same species. More recently, further material has come from Colombia (*Herbert H. Smith* 1980, San Lorenzo ridges, Santa Marta, in Herb. Field Mus., Herb. New York Bot. Gard., etc.) which shows many leaves like those of the type of *B. crithmifolia*, but with leaf divisions narrower. A range of leaf outlines thus is shown that seems unbelievable, easily entitling *B. crithmifolia* to rank in this respect with such species as *B. heterophylla* Ort.

*BIDENS HIRTELLA* H.B.K. Nov. Gen. 4:232. 1820.—*Bidens procumbens* H.B.K. *loc. cit.*

The type of *B. procumbens* (in Herb. Mus. Hist. Nat. Paris) differs only in the slightest way from that of *B. hirtella* (*ibid.*). KUNTH (H.B.K. *loc. cit.*) admitted the two forms to be very close. Had he possessed the wide range of data concerning variations in the related species of *Bidens* that, during the century since then, have steadily accumulated, he would not have hesitated to treat these as specifically the same.

***Bidens chrysanthemifolia*** (H.B.K.). comb. nov.—*Cosmos chrysanthemifolia* H.B.K. Nov. Gen. 4:239. 1820; *Cosmea chrysanthemifolia* Sprengel, Syst. Veg. ed. 16<sup>III</sup>. 615. 1826; *Cosmos*

<sup>6</sup> It is interesting to note that the mature head on the type of *B. delphinifolia* has at least one achene that is positively 2-aristate, showing no indication of a third awn ever having been present (cf. H.B.K. *loc. cit.*, "triaristata").



*chrysanthemoides* DC. Prodr. 5:607. 1836; *Bidens Kunthii* Schz. Bip. Seem. Bot. Voy. Herald 308. 1852-1857; *Bidens parvulifolia* E. E. Sherff, BOT. GAZ. 56:490. 1913.

This species was stated definitely by DECANDOLLE (*loc. cit.*) to come from Mexico, but KUNTH (H.B.K. *loc. cit.*) himself was uncertain as to its native country. DECANDOLLE, moreover, commented upon the closer affinity of the achenes with those of *Bidens* than with those of *Cosmos*. Whether he altered the specific name, however, through intent or through error, I am unable to say. But later, SCHULTZ BIPONTINUS (SEEM. *loc. cit.*), who frankly declared his belief that *Cosmos* was not a valid genus, used this altered name in citing it as a basis for his *Bidens Kunthii*, a name that, according to the Vienna Code, cannot stand.

ASA GRAY (Proc. Amer. Acad. 19:16. 1884) strongly suspected that this plant was merely *Bidens humilis* H.B.K. and suggested a reexamination of the type material. KUNTH (H.B.K. *loc. cit.*) had described the color of the rays as "violacea, basim versus sulphurea." This description is borne out, not only by the coloring in the plate cited (that is, in copies of KUNTH's work having the plates colored, as in John Crerar Library, Chicago), but by the type specimen in Paris (Herb. Mus. Hist. Nat. Paris), clearly the one from which the plate was made. This specimen, though discolored as to its rays, shows at least that the proximal ends of the rays were colored differently from the remaining portions, which latter seem surely to have been some shade of red.

More recently, fine material has been collected in Guatemala (Heyde and Lux 6173, alt. 900 m., Fraijanes, Dept. Amatitlan, September 1893, in Herb. Univ. of Chicago and in Herb. Kew), which belongs here. Singularly enough, it had been determined by JOHN DONNELL SMITH as *Bidens humilis* (cf. Gray *loc. cit.*), but the roseate rays and more or less *Cosmos*-like aspect are very distinct. The color of the rays in the dry condition varies from a pronounced roseate to a faded yellowish color, rather than showing a distinct sulphureous color definitely located toward the base as described by KUNTH. Still further material from the same small district in Guatemala (W. A. Kellerman 6112, alt. about 2500 m., Vol. Pacaya, Dept. Amatitlan, January 6, 1907, in Herb. Field Mus.) has been collected and fortunately is in a more mature condition. The

mature achenes match the ovary figured by KUNTH and show that there is not the slightest tendency to become rostrate as in *Cosmos*.

An examination of the original description of *Bidens parvulifolia* (Sherff, *loc. cit.*) shows that the second cited specimen (which I had seen in the U.S. Nat. Herb.) was obtained by the same collectors at the same altitude, time, and locality as was *Heyde* and *Lux* 6173 (see foregoing). The dried ligules were yellowish, the leaves were pubescent, and all but the top pair were simple. Since then, however, I have found other specimens (*Heyde* and *Lux* 6162 and 6163) showing numerous intergradations between the simple, pubescent leaves and the compound, mainly glabrous leaves; also, variations to a roseate color are shown in the rays. Thus *Bidens parvulifolia*, incredible as it will seem to any botanist who does not have at hand the intermediate specimens, must be interpreted as merely a form of *Bidens chrysanthemifolia* having minute, mainly undivided leaves.

BIDENS CERNUA L. Sp. Plant. 832. 1753.<sup>7</sup>—*Bidens gracilentia* Greene, Pittonia 4:255. 1901; *Bidens prionophylla* Greene, *loc. cit.* 256; *Bidens glaucescens* Greene, *loc. cit.* 258; *Bidens lonchophylla* Greene, *loc. cit.* 258; *Bidens Macounii* Greene, *loc. cit.* 259; *Bidens leptopoda* Greene, *loc. cit.* 260; *Bidens marginata* Greene, *loc. cit.* 262.

In 1901, GREENE (*loc. cit.*) described a number of new species of *Bidens*. On examination of his types (mostly in U.S. Nat. Herb.) and cotypes (mostly in Herb. Gray and in Herb. Field Mus.) nearly three years ago, I was dismayed to find that most of these species represented what ordinarily had been regarded as mere ecological forms of *Bidens cernua* and *B. laevis*. Direct conversation with Dr. GREENE himself showed that back of his viewpoint regarding *B. cernua* (Greene *loc. cit.* 251–253) was the absolute conviction that the American specimens were native to America, and, being so, were hence specifically different from European specimens.<sup>8</sup> However, personal field study for the past four autumns, combined

<sup>7</sup> Here, as elsewhere in this series of articles, only the most relevant synonyms are cited, the others being left for a complete monographic treatment later.

<sup>8</sup> In emphasizing his views upon this subject, Dr. GREENE exclaimed: "I defy you to find a single species of Compositae that is native both to Europe and to North America." It is not my intention to discuss this opinion here, since it is quoted merely to show his viewpoint. I do desire, however, to acknowledge with gratitude the courtesies shown me by Dr. GREENE from time to time. For over two years we had been making field observations for each other upon various species of *Bidens*, but his recent death brought this mutual aid to an abrupt end.

with a careful examination of a vast amount of *B. cernua* material from different American and European stations, has convinced me only the more of the utter impossibility of separating the many forms as species. Scarcely a form occurs in the United States that is not duplicated by a precisely similar form in Europe. Even GREENE himself (*loc. cit.* 252) was compelled to declare "after careful and repeated comparisons made between European and American specimens of so-called *B. cernua*, I acknowledge inability to detect any strong technical characters upon which to separate them."

Again, in a single colony of *B. cernua*, frequently three or more dissimilar forms occur, with numerous intergradations. Thus in a single small colony north of Elgin, Illinois, many plants were diminutive, matching *B. minima* Huds.; some were tall and robust, matching *B. leptopoda* Greene (the type of which Professor J. M. MACOUN of the Canadian Geol. Surv. Herb. at Ottawa kindly permitted me to examine); and some were small plants grown from the rooting nodes of tall plants trampled down by cattle, and were practically identical with *B. marginata* Greene. In the same way, several of GREENE'S types are found on comparison with their cotypes in other herbaria to be merely slight variants from the standard form. In several of these cases, GREENE'S description was much too narrow to fit even the few cotypes examined.

BIDENS AMPLISSIMA Greene, Pittonia 4:268. 1901.

This species has been discussed already (Sherff, BOT. GAZ. 59: 312. 1915). The name *Bidens elata* then proposed as a substitute has since been found, however, at variance with an example cited in the Vienna Code for a similar case. Hence *B. elata* cannot be retained as technically the valid name.

BIDENS LAEVIS (L.) B.S.P. Prelim. Cat. N.Y. 29. 1888.—*Helianthus laevis* L. Sp. Plant. 906. 1753; *Helianthus foliis lanceolatis serratis laevibus* Gronov. Fl. Virg. 1:104. 1739;<sup>9</sup> *Bidens chrysanthemoides* Michx. Fl. Bor. Amer. 2:136. 1803; *Bidens helianthoides* H.B.K. Nov. Gen. 4:230. 1820; *Bidens elegans* Greene,

<sup>9</sup> I could not find CLAYTON'S no. 195 among the Gronovian plants at the British Museum, and am unable personally to confirm this citation except from GRONOVIVS' description. But, in 1869, ASA GRAY (so Miss MARY A. DAY of Gray Herbarium has kindly ascertained for me) worked upon the Gronovian plants of the British Museum and listed CLAYTON'S no. 195 as "195 *Bidens chrysanthemoides!* (not *Heliopsis laevis*)."

Pittonia 4:254. 1901; *Bidens lugens* Greene, *loc. cit.*; *Bidens formosa* Greene, *loc. cit.* 264; *Bidens Parryi* Greene, *loc. cit.* 265; *Bidens persicae-folia* Greene, *loc. cit.* 266.

The types of *Bidens chrysanthemoides* Michx. and *B. helianthoides* H.B.K. (both in Herb. Mus. Hist. Nat. Paris) appear precisely the same. The original description of both species shows their achenes to have been 2-aristate in each case, although many specimens have since been gathered showing the achenes often 3 or 4-aristate. A study of numerous specimens from the United States and Mexico seems to indicate a slight tendency for the western specimens to be more often 2-aristate, the eastern ones more often 3 or 4-aristate. But the variations are so abundant as to defy all attempts at delimiting the separate forms or races in a specific way (cf. TORR. and GR. Fl. N. Amer. 2:353. 1842).

GREENE cites a single sheet for *B. formosa*, a plant from Delaware County, Pennsylvania. But in the Field Museum are 5 sheets of material (all by J. K. Small, Wetzel's Swamp, N. Harrisburg, September 1887) from the same state, and these show all gradations between *B. formosa* and *B. laevis*. Again, GREENE terms his *B. Parryi* an unwelcome species, "as uniting the habit of *B. cernua* and the fruit of the *Platycarpaea* group of species." But even if *B. Parryi* were a valid species, it would not be the first species to do this; for all the material of *B. laevis* that has flat, biaristate achenes does the same; and, moreover, *B. radiata* Thuill. (*B. platycephala* Oerst.) had long been noted as a species that likewise united *B. cernua* with *B. tripartita*, the latter a principal species of the *Platycarpaea* group (cf. G. SCHWEINFURTH, Verhand. Bot. Verein Prov. Brand. 2:145. 1861). Indeed, GREENE himself, on another occasion (*loc. cit.* 261) had been led to consider *B. radiata* in this same connection, having suspected his *B. leptopoda* as being this species. DECANDOLLE, in monographing the genus *Bidens* (Prodr. 5:594. 1836), defined the subgeneric section *Platycarpaea* with the evident purpose of admitting just such species as *B. cernua*, and actually classed *B. cernua* among the *Platycarpaea*.

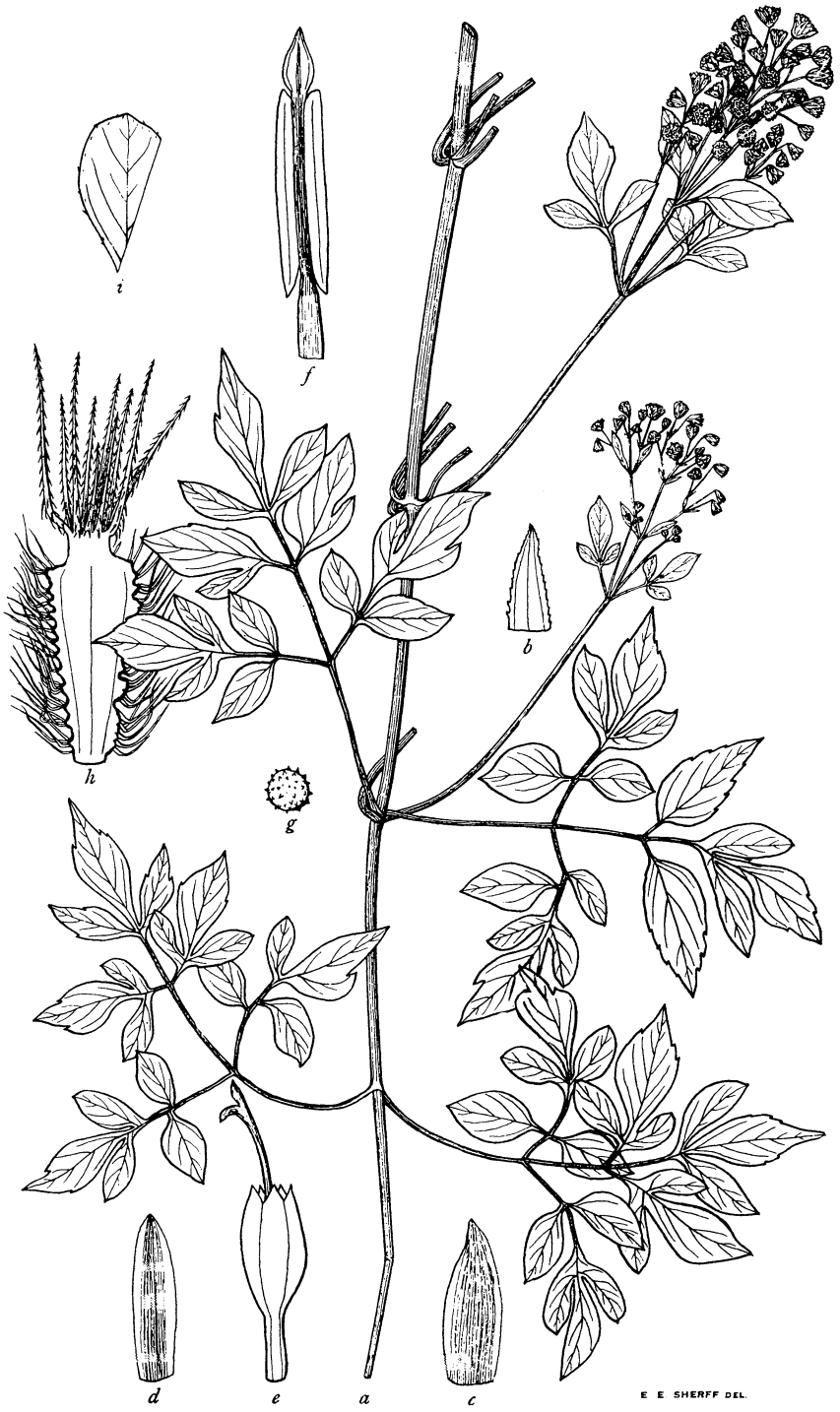
Hence GRAY saw this plant and determined it personally. As his knowledge of this species was very keen, there is no question as to his accuracy. LINNAEUS' private specimen of *Helianthus laevis* L. (in Herb. Linn.) is *Heliopsis* (cf. GRAY, Synopt. Fl. 1<sup>11</sup>:255. 1884; also PERSOON, Synops. Plant. 2:473. 1807).

Several other species described by GREENE and based upon characters seemingly inconsistent or difficult at present to evaluate, are reserved for later treatment.

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#### EXPLANATION OF PLATE XXXI

*Bidens mirabilis*.—*a*, spray  $\times 0.7$ ; *b*, exterior bract  $\times 4$ ; *c*, interior bract  $\times 4$ ; *d*, palea  $\times 4$ ; *e*, floret  $\times 7$ ; *f*, anther  $\times 35$ ; *g*, pollen grain  $\times 350$ ; *h*, achene  $\times 11$ ; *i*, portion of leaflet  $\times 3$ ; all from type in Herb. Kew.



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SHERFF on BIDENS